

temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

17. An apparatus according to Claim 12 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

18. An apparatus according to Claim 12 wherein at least one chemo/electro-active material is a metal oxide.

19. In a multi-component gas mixture having a temperature of about 400°C or more, an apparatus for calculating the concentration of at least two individual analyte gas components in the mixture, comprising:

- (a) an array of at least three chemo/electro-active materials connected in parallel circuitry, the array being situated within the gas mixture, and each chemo/electro-active material exhibiting a change in electrical resistance upon exposure to each of the individual analyte gas components, wherein at least one chemo/electro-active material, when at a temperature of about 400°C or more, (i) has an electrical resistivity in the range of about 1 ohm-cm to about 10^5 ohm-cm, and (ii) exhibits a change in electrical resistance of at least about 0.1 percent upon exposure of the material to an analyte gas component, as compared to the resistance before exposure;
- (b) means for determining the change in resistance of each chemo/electro-active

material upon exposure of the array to the gas mixture; and

- (c) means for calculating the concentration of each of the individual analyte gas components from the changes in resistance of the chemo/electro-active materials.

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20. An apparatus according to Claim 19 wherein the gas mixture is an emission from a combustion process.

21. An apparatus according to Claim 19 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

22. An apparatus according to Claim 19 wherein the electrical response characteristic of each material upon exposure to the gas mixture at a selected temperature is quantifiable as a value, and the response value of at least one material is constant or varies by no more than about twenty percent during exposure of the material to an analyte gas component at the selected temperature for a period of at least about one minute.

23. An apparatus according to Claim 19 wherein at least one chemo/electro-active material is a metal oxide.

24. An apparatus for analyzing at least one individual gas component in a multi-component gas mixture, comprising:

- (a) an array of at least two chemo/electro-active materials, each chemo/electro-active material having a different electrical response characteristic upon exposure at a selected temperature to the individual gas component than each of the other chemo/electro-active materials, the electrical response characteristic of each material being quantifiable as a value, wherein the response value of at least one material is constant or varies by no more

than about twenty percent during exposure of the material to an individual gas component at the selected temperature for a period of at least about one minute;

- 5 (b) means for determining the electrical response value of each chemo/electro-active material upon exposure of the array to the gas mixture; and
- 10 (c) means for performing an analysis of the individual gas component from the electrical response values.

25. An apparatus according to Claim 24 wherein the array is situated within the gas mixture, which has a temperature of about 400°C or more.

- 15 26. An apparatus according to Claim 24 wherein the gas mixture is an emission from a combustion process.

27. An apparatus according to Claim 24 wherein the means for performing analysis is means for calculating the concentration within the gas mixture of the
- 20 individual gas component.

28. An apparatus according to Claim 24 wherein the temperature of each chemo/electro-active material is determined substantially only by the variable temperature of the gas mixture.

- 25 29. An apparatus according to Claim 24 wherein the electrical response is selected from the group consisting of resistance, impedance, capacitance, voltage or current.

- 30 30. An apparatus according to Claim 24 wherein at least one chemo/electro-active material is a metal oxide.

31. In a multi-component gas mixture having a temperature of less than about 400°C, an apparatus for analyzing at least one individual gas component in the
- 35 mixture, comprising:

- (a) an array of at least two chemo/electro-active materials, each chemo/electro-active material having a different